

F R E D S P I E R

BIG

HISTORY

AND THE FUTURE OF

HUMANITY

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INTRODUCTION TO BIG HISTORY

Introduction

This book is about big history: the approach to history that places human history within the context of cosmic history, from the beginning of the universe up until life on Earth today. In a radical departure from established academic ways of looking at human history, in big history the past of our species is viewed from within the whole of natural history ever since the big bang. In doing so, big history offers the modern scientific story of how everything has become the way it is now. As a consequence, big history offers a fundamentally new understanding of the human past, which allows us to orient ourselves in time and space in a way no other form of academic history has done so far. Moreover, the big history approach helps us to create a novel theoretical framework, within which all scientific knowledge can be integrated in principle.

The term ‘big history’ was coined by historian David Christian.¹ In the 1980s, Christian developed a cross-disciplinary course at Macquarie University, in Sydney, Australia, in which academics ranging from astronomers to historians gave lectures about their portions of the all-embracing past. This course has become a model for other university courses, including the ones I have been teaching since 1994, first at the University of Amsterdam and later also at the Eindhoven University of Technology.

Although all the knowledge taught in big history courses is readily available in academia, only rarely is it presented in the form of one single historical account. This is mostly the result of the fact that over the past 200 years, universities have split up into increasing numbers of specializations and departments. Since the 1980s, however, academics ranging from historians to astrophysicists have been producing new grand historical syntheses, set forth in books and articles.

In the pages that follow, I seek to explain big history. Within the emerging field of big history scholarship, this book presents a novel account of our all-

embracing past. Building most notably on the work by US astrophysicist Eric Chaisson, a historical theory of everything is proposed, in which human history is analyzed as part of this larger scheme. In chapter two this theoretical approach will be introduced, while in the subsequent chapters it will be applied to big history. In this first chapter, a selected number of themes are discussed that are vital for a better understanding of big history.

Studying the Past

To understand the view of history proposed in this book, it is important to first address the question of how the past can be studied. Harvard historian Donald Ostrowski succinctly formulated his answer as follows: ‘We can’t study the past precisely because it’s over, gone.’² By saying so, Ostrowski pointed to the undeniable fact that all we know about history can only be found in the present, because if this knowledge were not available here and now, how could we possibly know about it? This is just as much the case for the history of the universe as for the history of us people.³ The idea that all historical knowledge resides in the present is not a new point of view among historians. Yet it is rarely stated very clearly.⁴ As I hope to show, in big history, this issue is perhaps even more urgent than in traditional historical accounts.

Because all evidence of the past can only be found in the present, creating a story about the past inevitably implies interpreting this evidence in terms of processes with a certain history of its own. We do so, because we experience both the surrounding environment and our own persons to be such processes. As a result, all historical accounts are reconstructions of some sort, and thus likely to change over time. This also means that the study of history cannot offer absolute certainties, but only approximations, of a reality that once was. In other words, true historical accounts do not exist. This may sound as if there is endless leeway in the ways the past is viewed. In my opinion, that is not the case. Just as in any other field of science, the major test for historical reconstructions is whether, and to what extent, they accommodate the existing data in a concise and precise manner. Yet there can be no way around the fact that all historical reconstructions consist of a selected number of existing data placed within a context devised by the historian.

The idea that all our knowledge of the past resides in the present also means that we do not know anything about things that may once have happened but did not leave any traces in the present. We do not know anything either about events that actually did leave traces in the present that have not yet been uncovered or interpreted as such. All of this may well be the largest portion of what has happened in history, yet we will never know for sure. Surprisingly, perhaps,

this rather problematic aspect of studying the past appears to have received very little attention among historians. Yet if the opposite situation existed, namely that we had at our disposal exhaustive information about everything that had ever happened, we would be totally drowned by the available data. Furthermore, as William McNeill has argued, the art of making a persuasive historical reconstruction consists to a considerable extent of what is left out.⁵ As a result, all historical reconstructions are rather patchy maps.

To make a reasonably persuasive historical reconstruction, we need to do at least two things, namely (1) find out what has happened to the data since they were generated, including their discovery by humans, and (2) find out what these data tell us about the past. Inevitably, academic studies of history always involve these two types of reconstruction, although this is certainly not always shown explicitly. For big history, Bill Bryson's best-selling overview *A Short History of Nearly Everything* may serve as an illustration of mostly the first type of historical account, while David Christian's magnum opus *Maps of Time: An Introduction to Big History* offers an example of both types of historical reconstruction.⁶

Any scholarly account of the past is constructed by using logical reasoning, including some sort of theoretical framework, which may be either implicitly or explicitly formulated. Ideally, all the available data should fit this framework. In practice, however, that is rarely the case, which often gives rise to long discussions of how the past should be viewed. These general issues have been discussed by generations of historians and philosophers. It is not my intention to provide an overview of these issues here. Yet it may be helpful to consider that an important human characteristic that allows us to make reconstructions is our capacity for pattern recognition and map making. Humans are endowed with this capacity to a much greater extent than any other animal.⁷ This capacity has allowed our species to become what it is today.

However uncertain historical reconstructions may be, the only firm statements we can actually make all deal with the past. Clearly, we do not have any data at our disposal of what the future will bring. As a result, we can only construct more or less likely scenarios of the future, based on observational data in the present. One might argue that it is possible to make firm statements about the present, but unfortunately, also the present is a rather fleeting category. Although the present is 'where the action is,' as soon as we talk about it, it has become part of the past. This is also the case for scientific experiments. Even while performing scientific measurements, those aspects of the present we are seeking to get a grip on are gone forever. What we do retain, however, if we do our work well, are the observational data, which may be more or less durable, depending on how well we did our job in recording them. As a result, every study of the present inevitably becomes a reconstruction of the past. That

is why the study of history should be regarded as both the queen and king of the sciences.

The present is actually an even more problematic category. I sometimes point out to my students that, while looking at each other during our meetings, we are looking at images of each other's pasts. There is no way around this conclusion. Everything we perceive about one another is based on sensory data: within a student-teacher setting, this is mostly sound and light, but also smells. These data take time to reach us. Sound in air at sea level under so-called standard conditions travels at about 1,225 km per hour (761 miles per hour), while light in a vacuum moves at about 1,079,252,848 km per hour (about 670,616,629 miles per hour). Although, within an academic class setting, the resulting time lags are very small and therefore in practice virtually negligible, they do exist. As a result, we are always looking at images of the past, while the only present we can be sure of is to be found within ourselves.

Yet even that statement is problematic. One may wonder, for instance, where within us the present would be located. Is it situated in our brains, where supposedly the awareness of us and of the surrounding world resides? Surely, any sensory data that we pick up with, for instance, our eyes or our fingers must have taken time to reach our brains. And then, one may wonder, where exactly in our brains? My conclusion is, therefore, that all the commonly used views of a shared and known present are human constructions.

While considering direct human interactions, this may sound like nitpicking. Yet in big history, these problems soon become overwhelming. For what can we say about the present of larger settings, such as our current position within the universe? Because the universe is so large, it takes a long time for all the light to reach us. In general, the farther light has traveled before it reaches us, the longer it has existed. Astronomers therefore often say that, by capturing light from the sky, we are probing back in time.⁸ This immediately means that, with the current state of knowledge, it is impossible to gain an overview of the universe in its present form, because most of the light that is being emitted now in the universe has not yet reached us.

The study of history inevitably implies using a time frame that allows us to order the events that we are studying according to when they happened. During the past centuries, historians have expended a great deal of efforts in constructing such a reliable chronological time frame, which has become the backbone of history. This historical time frame is centered on Earth, while the recurring events of Earth's orbit around the sun (years) and its rotation around its own axis (days and nights) provide stable markers that make it possible to subdivide the chronological time frame into days, weeks, months, years, decades, centuries and millennia. For studying the period of recent human history, about

10,000 years, these rotational movements have been sufficiently stable as not to cause any serious problems. Yet as soon as we start examining the history of Earth, which covers a period of about 4.6 billion years, we find that the rotation of Earth around its own axis has slowed down progressively, while we cannot be sure that its orbit around the sun has not changed either. In other words, while the years might have been different in the past, days and nights were significantly shorter also.

Because, in big history, we want to trace back events to the beginning of the universe, now thought to have happened about 13.7 billion years ago and thus long before Earth and the sun came into being, these issues become even more severe. Clearly, we cannot trace the remnants of early cosmic events in any other way than by observing them in the present from an Earthbound perspective. As a result, while making our reconstruction of big history, we inevitably use an Earthbound time frame that ends in the present. We simply do not have any other time frame at our disposal that can do the job. The time frame of our big history account is thus by necessity centered upon us. This does not mean, of course, that the evolution of the universe is Earth-centered. It only means that our account of it is centered on the present.

This point may need some further elaboration. With the exception of meteorites and other cosmic objects, all the data we receive from the rest of the universe consist of forms of electromagnetic radiation. Depending on the distance and our relative velocities, it takes a certain amount of time before this radiation reaches us. The radiation emitted by events that happened long ago and far away may reach us only now, while the radiation of other events that happened more recently and closer, may reach us at the same time. We do not know anything, however, about still other events that may have happened recently but far away, because that radiation has not yet reached us. In a similar way, we also do not know anything about events that happened a long time ago close to Earth, because that radiation has already passed us and will never return.

As a result, our ability to reconstruct the past of the universe with the aid of observed electromagnetic radiation is limited. For the past 10,000 years of human history, for instance, we cannot even tell how our own Milky Way has developed, because we are still waiting for most of the radiation to arrive. For what happened in the universe during the period of globalization (about 500 years), we only have data about the universe at a distance of, at most, 500 light years, which is a very small portion of our galaxy. In other words, the closer we come to the present, the less we know about the universe at large. And, as soon as we reach the present, we have only data at our disposal that deal with us – all the other data are about the past that is gone forever. This is why big history accounts are by necessity Earth- and human-centered.

One may argue that, because humans have been observing the sky for thousands of years, we possess data that actually make it possible to reconstruct longer stretches of cosmic history. The records of ancient star explosions, for instance, made by contemporary observers, coupled with modern observations, make it possible to reconstruct a sequence of events that happened after these cosmic fireworks went off. But that does not invalidate the general principle, namely that if we want to study empirical data from the universe that were generated close to the present, they must have been generated close to us. It may be fair to assume that the rest of the universe has developed in ways that are similar to our closer cosmic surroundings. If this were the case, our big history view would indeed be larger. Yet, with current detection techniques, such an assumption cannot be based on empirical data and could possibly be wrong as a result. If one wants to stick to a big history account that is based on empirical data, it is by necessity Earth-centered.

In sum, because the data that we use to reconstruct the past inevitably reside within the present, our analyses are always anthropocentric and geocentric to some extent. The art of making grand historical analyses of cosmic history consists, therefore, first of all in recognizing this, and then in dealing with the data accordingly. This is not easy. Yet it appears to be the only reasonable thing we can do.

The idea that our knowledge of the past resides within the present can be turned around by saying that, if we really want to know how everything we observe originated, we have to study big history. For instance, in chapter three we will see that the building blocks that are shaping our personal complexity today, as well as all the complexity surrounding us, can all be traced back to the emergence and evolution of the universe. This very basic insight offers a compelling reason of why big history would be important for all people who are interested in the origins of everything from a scientific point of view.

Most human societies have understood this intuitively. As David Christian has often emphasized, every known society has told stories about how they themselves and everything around them came into being. From an academic point of view, such narratives are now considered origin myths.⁹ But this does not mean that these stories should be considered unimportant. To the contrary, they have often provided shared orientation, meaning, identities and goals. Up until today, most, if not all, humans have been exposed to such stories in one way or the other. We do not know, of course, whether all people have always fully believed them. Surely, it seems wise to suspect that skeptics would have existed in all human societies. Yet we may also suspect that in most, if not all, early human groups the majority shared most of these views, especially because quite often, the number of available competing world views would have been limited, if they existed at all.

During the emergence of early state societies between 6,000 and 5,000 years ago, the new state elites began to promote their favored origin stories, while competing versions were often marginalized. For a long time, most, if not all, of these mythical big histories were local or regional in nature. This reflected both the size of the societies who told these stories and the extent of their contacts with others. For instance, the Inca view of the past did not include the Aztecs in Mexico, let alone Europeans (although some of their stories were later construed as referring to white people). The center of the world was their own region. Their capital city of Cuzco, for instance, was considered to be the navel of the world.

When societies became larger and more interconnected, some of these origin stories spread far and wide, while others fared less well. Examples of successful origin stories include Genesis in the Bible, similar stories in the Koran and also Hindu historical narratives.¹⁰ The globalization process, starting in the sixteenth century CE, has led both to the worldwide dissemination of these privileged origin stories and to the marginalization, if not total extinction, of most other such accounts.¹¹ It is only very recently that societies emerged in which modern scientific ideas have permeated the public sphere, while the mythical origin stories have mostly been relegated to the private sphere. In the meantime, the study of history had been virtually monopolized by universities, where it is defined as the history of literate people, resulting in the exclusion of all other accounts of the past. Why would modern academia define history in such a way?

A Very Short History of Academic History

The modern academic discipline of history emerged in the nineteenth century as part of the formation of nation states in Europe and the Americas. The first task of academic historians was to formulate a proud history of their own nation state (still known as ‘patriotic history’ in the Netherlands), which would provide a common identity to the inhabitants of these new social entities. In doing so, they followed in the footsteps of Roman historians of antiquity such as Titus Livius. The project of producing patriotic histories led to a great emphasis on the use of written documents. Over the course of time, historians also began to study other aspects of both their ‘own’ and other regions, while the study of national histories has become far more detached. Yet within academia, the study of human history as a whole has only rarely been practiced until today.¹² This remarkable situation may be linked to the fact that to do so would produce global identities, which are not directly associated with any presently viable state society.¹³

As a result of the emphasis on written sources, most historians begin their overviews of the past with the rise of literate societies. The attention is usually focused on those early states (often called ‘civilizations’) that are considered to be the precursors of their ‘own’ societies. The rest of human history is called ‘prehistory’ and is left to archaeologists.¹⁴ Whereas this academic division of labor appeared to have been caused mainly by the emphasis on written sources, there may also be another aspect to it. US historian Dan Smail emphasized in 2005 that the time span modern historians cover, about 6,000 years, is very similar to the total duration of history as told in the Old Testament. The reader may recall that, according to the famous calculations made by English bishop James Ussher in 1654 CE, the biblical world would have been created in 4004 BCE. Would this similarity between the biblical time span and the period established historians usually cover be coincidental, Smail wondered, or would modern historians perhaps still be ‘in the grip of sacred history’?¹⁵

In the eighteenth and early nineteenth centuries, as Smail argues, a good many popular human histories were written in Western Europe and North America that began with the biblical account. Subsequently, the recently acquired knowledge about the histories of people all around the world was integrated into this narrative. Some of these books became very popular and were printed in considerable numbers. Yet when nation states began to take shape – and with them the academic historical profession – these accounts were ignored within academia. No secular academic histories of humankind took their place, even though Leopold von Ranke, a major culture hero of academic historians, was very much in favor of writing human history, which he called both *Weltgeschichte* (world history) and *Universalgeschichte* (universal history).¹⁶ Enlightenment historians, such as David Hume, Edward Gibbon, William Robertson and François-Marie Arouet de Voltaire, who became culture heroes for academic historians, distanced themselves from religious approaches and, perhaps as a result, largely abandoned the search for origins. While sometimes attacking the popular human histories, these authors produced histories of ‘their’ nations, of similar other nations as well as of ‘their’ cultures by tracing them back to antiquity.¹⁷

During the first half of the twentieth century, only a few dedicated and courageous academic historians, most notably Arnold Toynbee, kept the study of human history alive. Outside of academia, however, human histories remained popular, such as the books written by H. G. Wells. More likely than not, this interest was stimulated by the ongoing process of globalization. Even though, for instance, British historian Geoffrey Barraclough argued strongly in favor of new forms of ‘universal, or general, history’ as long ago as 1955, until today most academic historians have not yet embraced any such accounts of the human adventure on Earth.¹⁸ In the middle of the twentieth century,

however, some change began to take place. Following Toynbee's example, a few farsighted scholars took the lead, most notably US historians William H. McNeill and Leften S. Stavrianos, while English historian John Roberts wrote *History of the World*. All these authors realized that for a good understanding of recent history it was important to trace the past all the way back to the origin of Earth, if not further. More recently, historian Bob Moore at the University of Newcastle, one of Roberts's students, has been an English pioneer in human history. In the 1980s, the idea of human history (usually called 'world history' in the United States) began to globalize. A good example of this type of scholarship is *The Human Web* by father and son William H. and John R. McNeill, published in 2003.

Not only have academic historians paid relatively little attention to human history as a whole, but by defining history as the history of literate people, they have also ignored the past of almost everything else we can observe around us. As a result, the history of life has become the domain of biologists; geologists are taking care of the history of our planet; while astronomers and cosmologists have been reconstructing the history of the universe. During the past 50 years or so, only very few academics have tried to forge all these stories into one single coherent historical account explaining how we, as well as everything around us, have come to be the way we are now.

A Short History of Big History

Because an established academic discipline of big history does not yet exist, no one appears to have written a history of big history and, as a result, start a big history tradition. All the established academic disciplines, by contrast, have created their own histories and traditions. Not unlike the proud patriotic histories of nation states, the histories of academic disciplines typically revolve around their culture heroes, while they rarely mention the social and ecological circumstances within which these people operated. Their lesser heroes are usually only mentioned in specific textbooks, while the villains, or the less welcome aspects of the heroes, are usually kept out of the story as much as possible. This almost inevitably conveys the idea of 'progress' in science.

Keeping these caveats in mind, we will now take a look at the vestiges that could become a history of big history. As yet, I cannot claim to have a good overview that highlights all the major players, good or bad. My research has led to some unexpected findings, and it may well turn out to be that there were actually far more early scholars who produced big histories than those mentioned here. Like all other academic accounts, my history of big history is a snapshot in time and thus likely to change somewhere in the future.

The first big history pioneer – and thus our first culture hero – may well have been Alexander von Humboldt (1769–1859), a most intelligent and sensitive man of Prussian descent. During his lifetime, von Humboldt was about as famous as Albert Einstein is today. Most of his work was read all over the North Atlantic academic world. Usually known as the father of geography (where he was adopted as one of its culture heroes), von Humboldt was interested in everything ranging from peoples and their cultures to the cosmos as a whole. Late in life, von Humboldt began to write a multi-volume series called *Kosmos*, in which he intended to summarize all the existing knowledge about the history of nature, including human history as he understood it. He called his approach ‘a cosmical history of the universe.’¹⁹ The first volume was published in 1845 CE in German. These books were widely read and translated into many languages. Unfortunately, von Humboldt passed away before finishing his project. In the first volume, he summarized his program as follows:²⁰

Beginning with the depths of the space and the regions of remotest nebulae, we will gradually descend through the starry zone to which our solar system belongs, to our own terrestrial spheroid, circled by air and ocean, there to direct our attention to its form, temperature, and magnetic tension, and to consider the fullness of organic life unfolding itself upon its surface beneath the vivifying influence of light. ... By uniting, under one point of view, both the phenomena of our own globe and those presented in the regions of space, we embrace the limits of the science of the Cosmos, and convert the physical history of the globe into the physical history of the universe, the one term being modeled upon that of the other.

Alexander von Humboldt, as shown in Figure 1.1, did not operate within a university setting. He was able to do a considerable part of his research and writing thanks to an inheritance, which made him financially independent. Such independence is characteristic of many original thinkers, including Robert Chambers, Charles Darwin, Albert Einstein and James Lovelock.²¹ Even though von Humboldt was never attached to a university, he was part and parcel of the emerging North Atlantic scientific tradition, to which he contributed a great deal.

Before von Humboldt was ready to write *Kosmos*, he had pursued what can be considered an exciting career by almost any standard. Trained as a mining inspector, von Humboldt at the end of the eighteenth century traveled through the Americas for five years together with his French companion Aimé Bonpland, experiencing the most amazing adventures while making an almost unbelievable range of scientific measurements. At 29 years of age onboard a sailing ship waiting to leave Spain for the New World, von Humboldt formulated his main goal in a letter dated 5 June 1799, as follows: